

Activity 1:

Use a planetarium software program to explore the apparent motions of the planets.

If you haven't already, now is the time to start trying out your sky simulation (or "planetarium") software. At <http://www.seds.org/billa/astrosoftware.html> there is a list of many such packages, including some that are free.

Most planetarium programs start up with a horizon and the sky you might see at night. Although the location is probably not right, go ahead and run the daily motion so you can see what it looks like. Watch for the Sun, Moon and planets to appear. Watch how the stars move. Any surprises? Our North Star course has a lot of information about how things appear to move in the sky as seen from different locations, in case you are curious to know more.

Most planetarium software needs you to fix the latitude to match your location so you can see the right part of the sky. If you want to find out what time something will rise or set, you will also need to set your longitude. If a table of latitude and longitude isn't built into your software, you can go to <http://www.census.gov/cgi-bin/gazetteer> for cities in the US. From this site, for example, I could find Ames IA at 42.02335 N, 93.62562. For locations outside the US, try <http://www.calle.com/world/index.html> to find the latitude and longitude of any of about 2.9 million cities, towns and villages around the world.

After looking at the sky from your location at different times of the year, try changing to "equatorial coordinates". This should get rid of the horizon and show you a patch of the sky with the stars fixed. (These could be called "star map" coordinates.) Scroll around until you see the planets and then run the motion again, this time perhaps faster. (Usually you can speed it up by telling it to show you the sky at longer intervals, such as every day or every 12 hours.) Find Mars and watch how it moves over the course of a year or two – you may need to expand your field of view to see more of the sky to make this obvious. What do you notice about the motion of Mars?

Now put the Sun in the middle and watch what happens to the inner planets, Mercury and Venus. Notice anything odd? You may be able to make the Sun stand still; if so, what do you see the planets doing?

Finally, try to shift to a view from above the solar system. Different programs handle this differently; in some, you might observe "from a planet - the Sun - position above the planet", for example. This view might also be called an "orrery view". Watch the planets in the orrery view, and make a note of what you observe.

In a few planetarium programs you may be able to open two windows and watch the same motions simultaneously as they appear in the orrery view and as they appear from Earth.

Unit 1 covers the apparent motions of the planets in the sky, first from the point of view of an observer on Earth and then from an outside perspective. You may find it convenient to come back to your planetarium software from time to time.